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What Happens when Users are not able to Perform Coping Mechanisms? An Investigation of the Habituation Process

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Research-in-Progress

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Abstract

In some situations individuals are unable to perform coping mechanisms against technostress because of low controllability and resources. Thereby, they are repeatedly exposed to technology-related stimuli named IT-stressors, which should result in several user responses such as emotional exhaustion, physiological arousal, and poor performance. However, in these situations individuals might habituate to the IT-stressor such that the user responses are mitigated. We assume that the influence of the IT-stressor on emotional exhaustion, physiological arousal, and performance is moderated by this habituation effect. Therefore, we propose an experimental setting in which individuals are repeatedly exposed to a computer breakdown to which they might get used to over time. During the experiment, we draw on self-reporting and objective methods to capture user responses after each exposure to the IT-stressor, in order to analyze the change of the user responses across time. Thereby, we expect the results to contribute to technostress and coping literature.

Keywords: Habituation, technostress, coping

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Research-in-Progress

Introduction

Individuals perform coping mechanisms in order to reduce or avoid technostress (Galluch et al. 2015; Liang and Xue 2009). Technostress is stress perceived when using information technology (IT) and encompasses technology-related stimuli named IT-stressors and their consequences (Ragu-Nathan et al. 2008). These IT-stressors cause negative user responses leading individuals to stop using the IT (Maier et al. 2015; Turel 2014), which in turn has significant implications for organizations (e.g., costs) and individuals (e.g., health issues) (Tarafdar et al. 2015), forcing them to perform coping behavior (D'Arcy et al. 2014; Galluch et al. 2015). However, in some situations, organizations and individuals are not able to perform coping mechanisms because of less controllability and resources or the coping behavior does not change the situation or the emotional state of the individual. In these situations, individuals are repeatedly encountered by IT-stressors and experience its negative responses. For example, avoiding computer breakdowns might not be possible because of low technical controllability in terms of a lack of technical skills or low resources in terms of time restrictions. When users perceive the same breakdown again and again, the repeated exposure to the IT-stressor might result in several user responses such as emotional exhaustion, physical arousal, and poor performance. However, in situations in which individuals are not able to perform coping mechanisms they might become habituated towards the IT-stressor due to its repetition. This might result in the perception of the IT-stressor and its responses to decrease over time. In other words, individuals get used to the computer breakdown due to its repetition which leads to a decrease in emotional exhaustion, physical arousal, and to an increase in performance. Psychological research shows *"a behavioral response decrement that results from repeated stimulation" (Rankin et al. 2009, p. 136)*. Furthermore, one characteristic of habituation is that when *"a particular stimulus elicits a response, repeated applications of the stimulus result in decreased response (habituation)"* (Thompson and Spencer 1966, p. 18). Therefore, due to the repetition of the IT-stressor individuals might learn to filter out irrelevant stimuli and concentrate on the important ones (Rankin et al. 2009) such that the intention to discontinue the IT usage might be reduced. Hence, the present research-in-progress aims to answer the following research question:

> *Does the repeated perception of a specific IT-stressor result in habituation such that the responses of the IT-stressor are reduced?*

The remainder of this research-in-progress paper is structured as follows. The theoretical background of technostress and coping as well as habituation is presented next. Thereafter, we develop the hypotheses. Following this we present the methodology containing the experimental design, experimental procedure, and measurement. Finally, a discussion section is reserved where the expected contribution of the research-in-progress paper is outlined.

Theoretical Background

Technostress and Coping

Technostress is stress perceived when using IT (Ragu-Nathan et al. 2008) and should be understood as an umbrella term, which comprises users' perceptions of IT-stressors and their responses to these IT-stressors, which are called strains (Tarafdar et al. 2010). IT-stressors are technology-related stimuli perceived by the individuals (Ayyagari et al. 2011). Strain is the response towards the IT-stressors and can be psychological, physiological, and behavioral (Cooper et al. 2001). *Psychological strain* includes emotional response to the IT-stressor and has been interpreted as emotional exhaustion in prior technostress literature (Ayyagari et al. 2011; Tarafdar et al. 2010). *Physiological strain* includes bodily responses to stressors such as cardiovascular, biochemical and gastrointestinal symptoms (Riedl et al. 2012, 2013; Riedl 2013). *Behavioral strain* includes behavioral responses to the IT-stressor, such as poor

task performance (Tarafdar et al. 2010). To reduce and avoid IT-stressors and their responses users try to perform coping mechanisms. Users go through two cognitive processes to determine coping mechanisms. These can either be problem-focused coping, which actively determines the stressor, or emotional-focused coping, which try to regulate or change emotions in regard to the stressor (Galluch et al. 2015; Liang and Xue 2009).

Prior research investigates the antecedents and the responses regarding technostress. One research stream shows that organizational IT-stressors, such as work-home conflict, invasion of privacy, work overload, role ambiguity, and job insecurity, positively influence psychological and behavioral strain (Ragu-Nathan et al. 2008; Tarafdar et al. 2010). An additional research stream focuses on technical IT-stressors, such as computer breakdowns and technology unreliability. These show an influence on physiological strain (Riedl 2013). Coping literature focuses on individual coping mechanisms (Beaudry and Pinsonneault 2010; D'Arcy et al. 2014; Galluch et al. 2015; Liang and Xue 2009). Thereby, two cognitive processes are given in which users determine their coping mechanisms. such as problem- and emotional-focused coping (Beaudry and Pinsonneault 2005; Liang and Xue 2009). Results show that the control over methods and resources reduces the influence of IT-stressors on strain. Thereby, method control is understood as the skills to perform a method that help to accomplish a task and resource control enables individuals to remove themselves from these stressors (Galluch et al. 2015).

Taking together, technostress literature investigates the antecedents and responses of several IT-stressors but neglects the examination of the responses of repeated perception of IT-stressors. Coping literature mainly focuses on the evaluation of IT-stressor and on coping behavior, which actively counteracts IT-stressors and their responses but neglects the examination of situation in which individuals are not abele to perform comping mechanisms. The present research-in-progress paper proposes to investigate the repeated perception of IT-stressors in situations where individuals are not able to perform coping mechanism and therefore might habituate towards the IT-stressor.

Habituation

Habituation is a learning behavior which decreases a response as a result of repeated stimulation (Thompson and Spencer 1966). The rationale for habituation is based on the dual process theory (Groves and Thompson 1970) and the stimulus-model comparator theory (Sokolov 1963). The dual process theory (Groves and Thompson 1970) claims that a habituation and a sensitization process exist simultaneously. A stimulus triggers both processes. The habituation process renders habituation behavior results, as does the sensitization process for sensitization behavior results. In contrast to this, the stimulus-model comparator theory (Sokolov 1963) assumes that when a stimulus is repeatedly perceived the nervous system creates a model of the expected stimulus. Further presentations of the stimulus are compared to the model and if the stimulus complies with the model, then the responses decrease. Generally, habituation describes a form of learning that allows humans to filter out irrelevant stimuli and focus on important ones (Rankin et al. 2009). It is defined as *"a behavioral response decrement that results from repeated stimulation" (Rankin et al. 2009, p. 136).* Habituation occurs when stimuli is repeated. A novel stimulus leads to an individual's response which decreases when the same stimulus is presented repeatedly (Grissom and Bhatnagar 2009; Thompson and Spencer 1966). The magnitude and/or the speed of habituation are sensible to several criteria, such as the amount of stimuli, the frequency and the severity of the stimulus. Habituation is reversible which means that the habituation decreases when the stimulus is deleted or dishabituated by other stimuli (Grissom and Bhatnagar 2009).

The process of habituation within IS research is only present in few investigations. Sun et al. (2013) propose that in the context of banner processing the influences of structural and semantic salience of attention is moderated by the habituation level. Furthermore, they claim that behavioral frequency, structural stability, and semantic stability depict antecedents of the habituation level. Anderson et al. (2014) claim that users are not necessarily lazy regarding security messages, but rather habituate towards them. They argue that habituation is one explanation why users routinely ignore security warnings. Drawing on a NeuroIS method, they measure habituation and reveal that neural activity decreases over time.

Hypotheses Development

The Impact of IT-stressors on Strain

Research on the relationship between IT-stressors and psychological strain indicates that users confronted with IT-stressors face emotional exhaustion (Ayyagari et al. 2011; Ragu-Nathan et al. 2008; Tarafdar et al. 2010) (H1a). IT users react not only psychologically, but also physiologically when using stressful technology (Riedl 2013). Statistical evidence shows that IT-stressors such as computer breakdowns or pressure to perform lead to physiological strain such as an elevated cortisol levels (Riedl et al. 2012) or an increase of skin conductance (SC; Eckhardt et al. 2012; Riedl et al. 2013) (H1b). Prior research indicates that IT-stressors lead to a decrease in behavioral strain in terms of performance (Tarafdar et al. 2010; Tarafdar et al. 2014) (H1c). Consequently, we adapt these well-established hypotheses and assume that:

> *H1: Users who perceive an IT-stressor (a) are more psychologically (b) are more physiologically strained and (c) less behaviorally strained than those who do not perceive the IT-stressor.*

Moderation Effect of Habituation

Several investigations in psychology show a habituation process towards psychosocial strain (Schommer et al. 2003; Wüst et al. 2005). IT-stressors lead to a psychological strain in terms of emotional exhaustion (Ayyagari et al. 2011), which might decrease when the same IT-stressor is presented repeatedly, since individuals learn to filter out bad stimuli (Rankin et al. 2009), mitigating the effect of the IT-stressor on psychological strain (H2a). Regarding physiological strain, results show that a *"given stimulus elicits an HPA [hypothalamic-pituitary-adrenal] response, repeated exposure to that stimulus will elicit a progressively reduced response"* (Grissom and Bhatnagar 2009, p. 4). Habituation process regarding physiological responses has been investigated towards several different stressors (Bhatnagar et al. 2002; Grissom et al. 2007). IS literature indicates that IT-stressors such as computer breakdowns lead to physiological strain such as a high SC or increased cortisol levels (Riedl et al. 2012, 2013). When individuals learn to ignore the repetitive stressor, they might get used to the IT-stressor such that the influences of the IT-stressor on physiological strain is diminished (H2b). Referring to behavioral strain, IS literature shows that behavioral strain in terms of performance is reduced by the exposure of IT-stressors (Tarafdar et al. 2010; Tarafdar et al. 2014). As explained above, individuals might habituate towards the IT-stressor such that the influence of the IT-stressor on the performance is reduced (H2c). For example, in a situation in which a computer breaks down for the first time individuals are psychologically strained in terms of emotional exhaustion, physiologically strained in terms of an increase in emotional sweating, and behaviorally strained in terms of poor performance. Because individuals are not able to cope with the IT-stressor because of low controllability and resources, they experience the computer breakdown again and again. However, instead of the users being increasingly emotionally exhausted, physiologically aroused, or performing increasingly worse, the responses of the users might be alleviated by each further breakdown because of the increased habituation level towards the IT-stressor. Hence, we assume that:

> *H2: The habituation level moderates the relation between the IT-stressor and (a) psychological strain, (b) physiological strain, and (c) behavioral strain to the extent that the effect of the relationship is stronger with the initial perception of the IT-stressor than after the continued repetition of the IT-stressor.*

Methodology

Experimental Design

The experiment follows a two factorial subject-within design, encompassing the factors IT-stressor (IT-stressor, non-IT-stressor) and habituation (repetition 1 to 8). As we follow a subject-within design, all participants encounter all treatments. The experiment contains one control group and eight treatments. During the first treatment, the participants do not perceive an IT-stressor and consequently are not able to habituate to the IT-stressor. This treatment is needed to capture a baseline in an unstrained situation. Subsequently, eight treatments follow in which the subjects are always exposed to the same IT-stressor such that they might habituate to that IT-stressor after several repetitions. Table 1 summarizes the experimental design.

		Habituation								
		Non-repetition	Repetition 1	Repetition 2	Repetition 3	Repetition 4	Repetition 5	Repetition 6	Repetition 7	Repetition 8
Stressor	IT-stressor		Treatment group	Treatment group	Treatment group	Treatment group	Treatment group	Treatment group	Treatment group	Treatment group
	Non-IT-stressor	Control group								

Table 1: Experimental design

Tasks and Used Technology

To emulate a realistic organizational situation we draw on an enterprise content management (ECM; Laumer et al. 2013) system such as MS SharePoint. In a text-based scenario participant's slip into the roll of an intern, that has to do several different tasks for his supervisor, which are all solvable by using MS SharePoint. During the experiment, each participant has to work on nine different tasks. All tasks are simple to solve, in order to eliminate task complexity and to avoid the requirement of any SharePoint experience. In addition, the tasks have roughly the same level of difficultness and are solvable within the same time frame. In the scenario, the subjects have to work on tasks such as the following: the intern is requested to search for a contact person in the HR department within the system. In this case, the subjects have to navigate from the main window to the correct list of employees and find the desired contact person of the HR department.

Manipulation: IT-stressor and Habituation

We chose a computer breakdown as a IT-stressor (Riedl et al. 2012), simulating a 30 seconds system freeze during which input via mouse or keyboard is impossible. This freeze can be remotely activated by the facilitator. To manipulate the habituation level we repeatedly expose the subjects with the same stimulus as in prior investigations (e.g. Rankin et al. 2009) and try to keep the working environment stable such that the subjects are able to learn how to habituate towards the IT-stressor. Individuals are exposed to the IT-stressor eight times, which depicts a higher repetition rate than used in prior studies (e.g. Kirschbaum et al. 1995).

Experimental Procedure

The experiment is divided into a pre-experimental, an experimental, and a post-experimental phase. In the **pre-experimental stage**, participants arrive at our laboratory and are subsequently assigned to a desk in our laboratory. Subjects are isolated from each other and complete the experiment independently. After the subjects are seated, they get a short introduction of the following experiment. Before the experimental stage began, the subjects were fitted with the skin conductance (SC) equipment and filled out the first survey. In the **experimental stage**, subjects receive additional information of the tasks and the application running on the desktop computer. Subjects work on a text-based scenario in which they are instructed to imagine a situation in which they work as an intern for a large company. Within this text-based scenario, the supervisor of the intern is explaining the responsibilities and tasks of the intern. After the introduction, the subjects are confronted with their first task. Before that task, no manipulation occurs in order to obtain a baseline of the subjects' responses. During the task, we measure SC and capture the working time as a proxy of the performance. After the first task, the emotional state and the psychological strain level of the subjects are captured by the continuance state sampling method (CSS; see measurement). Before task two begins, the subjects encounter the first manipulation, which freezes the computer such that no inputs via keyboard and mouse are possible. The freeze continues for 30 second, and afterwards the subjects are able to continue working on the second task. We measure the SC again and the working time. After the subjects accomplish task two they are again asked about their emotional state and psychological strain level. In total, subjects are supposed to work on nine tasks whereby they encounter eight manipulations. We capture for each treatment the SC, the working time and after each task the emotional state and psychological strain level. In the **post-experimental stage,** the subjects fill out the second survey, which contains several control variables. Figure 1 shows the experimental procedure.

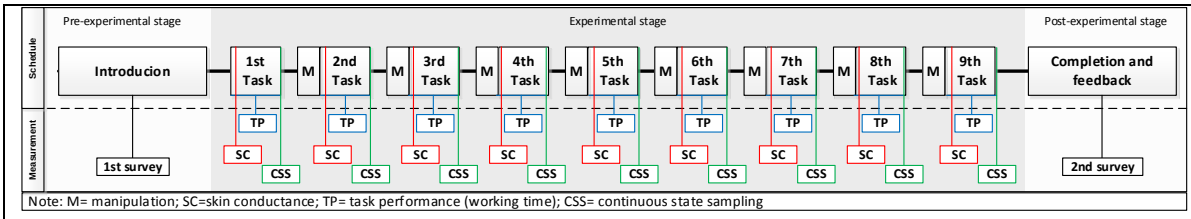

Figure 1: Experimental procedure

Measurement

Within the experiment, we capture the three depended variables psychological, physiological, and behavioral strain. In order to measure the psychological strain level after each treatment and thus after each repeated encounter of the IT-stressor we draw on an experience sampling method (ESM; Larson and Csikszentmihalyi 2014) called continuance state sampling (CSS; Sembill et al. 2008). The objective of this method is to capture the emotional state of the participants in everyday situations. In this method, the questions to measure the emotional state are based on a specific scenario. Participants are ask to report their feelings in a specific moment rather than measure their feelings later. The measurement can be initiated by a signal such as a beeping tone, an event such as a computer breakdown, or by a time interval. For example, in the present study the supervisor asks the intern about his/her emotional feels after each task. We use this method to measure emotional exhaustion based on Ayyagari et al. (2011) and emotions based on Beaudry and Pinsonneault (Beaudry and Pinsonneault 2010) after each treatment. Physiological strain in terms of physiological arousal is measured by SC. Behavioral strain in terms of performance is captured by the time needed to process each task (Gattiker and Goodhue 2005). To validated the manipulation (manipulation check) we measure IT-unreliability based on Ayyagari et al. (2011) in order to check whether the computer freeze is perceived as a threatening IT-stressor. In line with Sun et al. (2013) we measure the experiences level as a proxy for habituation (Hong et al. 2007) in order to check the change of the habituation level.

Discussion and Expected Contributions

Prior IS literature shows that organizations and individuals perform coping mechanisms to avoid technostress (D'Arcy et al. 2014; Galluch et al. 2015) because the IT-stressors and thus occurring user response lead an individual to stop using IT (Maier et al. 2015; Turel 2014). However, there are situations in which individuals are not able to perform coping behavior because of low controllability or resources or these coping behaviors are not affected in counteracting technostress. This situation depicts a black-box to literature because there are no findings about what happens when individuals are repeatedly exposed to IT-stressors and are not able to perform coping mechanisms. In order to open the black-box we introduce the present research-in-progress, which aims to answer whether the repeated perception of specific IT-stressors result in habituation such that emotional exhaustion and physiological arousal is reduced and performance is increased. In the present research-in-progress paper, we propose an experimental setting, which emulates a real business situation in which an individual is repeatedly exposed to computer breakdowns. During the experiment, we capture all three strain responses after each exposure to the IT-stressor to analyze the change of the responses over time. We assume that the influence of the IT-stressor on emotional exhaustion, physiological arousal, and performance is moderated by the habituation level. We draw on a neurobiological measurement of arousal in terms of SC and an objective measurement of performance in terms of working speed. By performing this experiment, we expect the result to contribute to technostress, coping, and adoption literature. Prior technostress literature mainly investigates the responses towards a single perception of an IT-stressor. As the present examination proposes a research design that investigates the repeated exposure to an IT-stressor we expect the results to extend prior technostress literature (Ragu-Nathan et al. 2008; Tarafdar et al. 2010). For example, the responses towards one exposure of an IT-stressor might significantly differ from the responses after a repeated exposure. Furthermore, prior coping literature focuses at the evaluation of the IT-stressor and on coping behavior, which actively counteracts IT-stressors and its responses. The present research proposes an experimental design, which focuses on the three-strain responses in the situation in which individuals are not able to cope actively with the IT-stressor and its responses. Prior results indicate

that control over the working method and resources lowers the influence of the IT-stressor on physiological strain (Galluch et al. 2015), whereas the present research proposes that a repeated exposure to the IT-stressor results in habituation and in turn in lower strain responses without coping mechanisms. We expect the results of the present study to extend the coping literature (Galluch et al. 2015; Liang and Xue 2009) by investigating the diminishing process of habituation which appears unconsciously in the repeated exposure to the IT-stressor instead of consciously and actively as other coping mechanisms. In addition, this research might provide insight why individuals continue using an IT even though there are many IT threats which individuals encounter by using an IT. Hence, we expect to contribute to the adaption literature focusing on continuance and discontinuance usage (Maier et al. 2015; Turel 2014).

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